AMENDMENTS TO THE DRAWINGS

Please substitute for the existing Fig. 1 the Replacement Drawing annexed hereto with the changes as follows:

"control mode" is changed to "--control node--"

and to show the ui input to statistics block 19.

Attachment: Replacement sheet
Annotated sheet showing changes

REMARKS

At the outset, Applicants note with appreciation that claims 2-3, 14, 16 and 21-27 would be allowable if rewritten or amended to overcome the objections set forth in the Office Action and that only claim 1 has been rejected over the prior art. Furthermore, Applicants wish to thank Examiner Tse for the time and courtesy shown Applicants' representative during the telephone conference of November 23, 2009.

Turning to the Office Action, it is noted that a formal Information Disclosure Statement must be provided to bring all of the prior art references cited in the Specification to the attention of the Examiner. Applicants submit herewith an Information Disclosure Statement.

The Specification was objected to because paragraph 103 included inappropriate underlines. Paragraph 103 of the specification is now amended to remove the underlines, no new matter is added as the changes are of a typographical nature only.

The Drawings are objected to because Fig. 2 is considered to be prior art. Applicants respectfully submit that Fig. 2 is not a prior art drawing. The inclusion and arrangement of bit rearranging circuit 16, SPA circuit 15 and ADC 13 provide inventive functionality removing Fig. 2 from the prior art. As taught in paragraph 33, the advantage of SPA 15 is that it may only create a delay ranging from 0 to 1/2T as a power saving. The other half of the period T/2 to T of the required range of 0 to T is done by switching BRC 16 into another state. This arrangement and operation is both novel and inventive and is not part of the prior art. Accordingly, Applicants respectfully submit that the drawing Fig. 2 is properly labeled.

However, in reviewing the application it has come to attention of the Applicants that Fig. 1 includes typographical errors and a replacement sheet of Fig. 1 is submitted herewith. In the replacement sheet "control mode" is changed to "--control node--". That this is a typographical error is clear from the specification in paragraph 83 by way of example. Furthermore, from the description of the operation of the optical

receiver at paragraphs 103 – 105 including the equation 1, it is known that MLSD 17 also provides an input to statistics block 19 to allow position dependent counting of the channel state condition to amplitude histograms. Therefore, the output u_i of MLSD 17 to statistics block 19 is shown in the replacement sheet for Fig. 1 and Applicants submit that no new matter is added.

Claims 1-27 are objected to on formal grounds and as well as being rejected under 35 U.S.C. §112. Applicants have amended the claims to incorporate the suggestions of the Examiner. With respect to claim 1, Applicants have changed "one digital word" to --a digital word– which Applicants submit provide the antecedent basis for the digital words. The reference to $(r_{i,1},r_{i,2})$ has been removed, so that it is now understood that although related, the one digital word is not the digital words. With respect to claim 5, lines 10 and 11, Applicants have amended the claims to better define that there are one or more of a first event and one or more of a second event and calculations for the sample branches are done for each of a first event or for each of said second event. Applicants now believe that the operation is clear as defined in the specification, particularly with respect to equations 1-3. With respect to claims 8, 15, 19-20, and 22-23 amendment was made in keeping with the suggestions and comments of the Examiner.

However, with respect to claim 16, Applicants submit that the antecedent basis for the branch metrics is provided in the last line of claim 2. With respect to claim 19, the language "following cases" has been removed and the claim has been amended to more clearly define that one of the conditions is that a pathological amplitude statistic is determined to be one of four distinct possibilities.

Applicants respectfully submit that the formal objections and rejections to the claims have been obviated. The amendments to these claims are formal in nature and do not represent new matter nor do they substantially change the scope of the claims from that as originally filed. Accordingly, Applicants respectfully request the withdrawal of the objections to claims 1-27 and the rejections of the claims under 35 U.S.C. § 112.

Claims 1, 4-13, 15 and 17-20 are rejected under 35 U.S.C. § 101 for failing to define statutory subject matter. Applicants respectfully traverse the rejection.

Applicants have amended claim 1 to define an optical receiver performing the method steps. Applicants respectfully submit that as discussed with the Examiner, an optical receiver is a particular apparatus to which the method is tied, and therefore qualifies as a statutory process. Accordingly, Applicants submit that the rejection under 35 U.S.C. § 101 has been obviated and Applicants respectfully request the withdrawal of the rejection under 35 U.S.C. § 101.

Applicants submit that claims 2-3, 14, 16 and 21-27 have been rewritten or amended to overcome the objections and rejections set forth in the Office Action and therefore are in condition for allowance as noted by the Examiner. Furthermore, claims 5-13, 15, and 17-20 are now in condition for allowance as the rejection under 35 U.S.C. § 101 has been obviated.

Turning to the substantive rejection, claim 1 is rejected under 35 U.S.C. § 102(a) as being anticipated by Hayami. Applicants respectfully traverse the rejection.

Applicants submit that claim 1 defines a method for channel estimation for an optical receiver which digitizes the analog signal representing a sequence of symbols and associating a digital word out of a plurality of digital words that would level the analog signal at each sampling time. The symbol period has at least two sampling times and each digital word corresponds to one out of a plurality of quantization levels. In other words, the period of the signal is two bits = 2T. The fundamental frequency is 1/2T. As a result of the claimed methodology, the spectrum may be limited from 0 to 1/2T skipping the spectrum above 1/2T for transmitting an arbitrary bit sequence with a bit type T. Such an optical receiver converts the square wave into a sign wave, but would not remove necessary information from the bit sequence. As a result, a binary 10Gb/s modulated wave form may be operated upon.

At the outset, Applicants note that Hayami makes no reference to the use of Nyquist sampling. Furthermore, as seen in Figs. 3a, 3b, Hayami sampling occurs once per bit time. This is as described at column 4, lines 28-20 of Hayami. Therefore, Hayami does not teach sampling twice per bit time as claimed and rejection under 35 U.S.C. § 102 is improper. Even if it was proper to force the use of Nyquist sampling on Hayami, one would not arrive at the claimed invention.

Hayami teaches a much different sampling rate. The Office Action considers Hayami to disclose a symbol having at least two sampling times, such as the well-known Nyquist sampling rate which the Office Action describes as being at least twice the input sampling rate, each digital word corresponding to one out of the quantization levels. However, Applicants respectfully submit that this is a misinterpretation of the Nyquist sampling rate. First, we note that the Nyquist frequency should not be confused with the Nyquist rate which is the lower bound of the sampling frequency that satisfies the Nyquist sampling criterion for a given signal or family of signals. This lower bound is twice the bandwidth or maximum component frequency of the signal. The Nyquist rate is a property of a continuous time signal, not of a system, whereas Nyquist frequency is a property of a discreet time system, not of a signal. Accordingly, as known from wikipedia.org/wiki/Nyquist_rate and wikipedia.org/wiki/Nyquist_frequency, the Nyquist frequency is half the sampling frequency of discreet signal processing system, but this is not the Nyquist rate.

Therefore, when comparing the claimed invention to the Hayami teaching and the implicit Nyquist rate as suggested in the Office Action, if either system were to sample a binary 10Gb/s modulated wave form, the highest spectral frequency to be preserved in the wave form is the Nyquist frequency of 5GHz. Conversely, the Nyquist rate leads to a sampling of a 5GHz band limited signal (for perfect reproduction) without aliasing 10G samples/second are necessary which corresponds to a symbol sampling where the data stream is sampled once per symbol internal.

The Office Action inappropriately converts the claimed cutoff frequency 1/2T into time and states that the Nyquist sampling rate, samples twice in this time. For the

reasons discussed above, the Office Action is incorrect when it states that the well-known Nyquist sampling rate is at least twice the input sampling rate.

In fact, the Nyquist sampling rate is equivalent to the bit rate. This is confirmed by U.S. Patent No. 5,263,053, column 2, line 17-27, which teaches the use of a Nyquist filter. This impulse response goes from 0 through whole number integer multiples of T. A Nyquist filter will exhibit no symbol interference distortion in the absence of noise and multi-path reception. Accordingly, as confirmed by U.S. Patent No. 5,263,053 a Nyquist filter is more compatible with sampling once per bit T, consistent with Hayami, but very different from the claimed invention. Accordingly, Applicants submit that claim 1 is allowable over the prior art and respectfully request the withdrawal of the rejection under 35 U.S.C. § 102.

Applicants have made a diligent effort to place the application in condition for allowance. If the Examiner is unable to issue an immediate Notice of Allowance, he is respectfully requested to telephone the undersigned attorney with a view towards discussing the outstanding issues.

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Respectfully submitted,

By _____

Howard M. Gitten
Registration No.: 32,138
EDWARDS ANGELL PALMER & DODGE LLP
P.O. Box 55874
Boston, Massachusetts 02205
(561) 820-0230
Attorneys/Agents For Applicant

Attachments